

***Tilletia dichelachnes* sp. nov. from New Zealand**

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ABSTRACT—A new species of smut fungus, *Tilletia dichelachnes*, is described from New Zealand. The teliospores of this species are very large and comparable in size to only four other species of *Tilletia*. *Tilletia dichelachnes* infects the flowers of an indigenous grass, *Dichelachne crinita* and is the first *Tilletia* species known on the genus.

KEY WORDS—bunt, covered smut, large spore, native fungus

Introduction

Some specimens of fungi were recently received from the University of Canterbury, most of which were collected by R.F. Ross McNabb (Thomson 1973) in the South Island of New Zealand in the 1960s. Among them was a smut fungus parasitising the ovaries of the native long-hair plume grass *Dichelachne crinita* (L. f.) Hook. f. (*Poaceae*). Morphologically it differs from other *Tilletia* species recorded in New Zealand by its large teliospores. Smut fungi are basidiomycetous microfungi that grow as biotrophic plant parasites both within and between plant cells.

Materials & methods

A dried herbarium specimen of a smutted grass was received from University of Canterbury. For light microscopy, teliospores were removed from the specimen, mounted in lactophenol on glass slides, and examined using an Olympus BH-2 microscope. For scanning electron microscopy (SEM), a small amount of dried

infected plant material was placed on sticky carbon tab adhering to a specimen stub. This was teased apart to release the spores and distribute them over the surface of the tab. The sample was then sputter coated with gold for 60 seconds and viewed in a SEM using an accelerating voltage of 10kV. The specimen was deposited in the New Zealand Fungarium, Manaaki Whenua – Landcare Research, Auckland, New Zealand (PDD).

Taxonomy

Tilletia dichelachnes McKenzie, sp. nov.

FIG. 1

IF 558646

Differs from all other species of *Tilletia* by its large teliospores and host plant genus.

TYPE: New Zealand, Mid Canterbury, Torlesse Range, 1 March 1964, on *Dichelachne crinita*, R.F.R. McNabb no. 68 (Holotype, PDD 117532).

ETYMOLOGY: From host genus, *Dichelachne*.

SORI concealed and filling caryopsis with a dark reddish brown spore mass, semi-agglutinated to pulverulent. TELIOSPORES 38.5–49 × 35.5–46.5 µm (mean = 44.4 × 42.2 µm, n = 40), globose or subglobose, brown; wall 1–1.5 µm thick, appearing reticulate in light microscope surface view, 8–15 meshes per spore diameter, irregularly warted in scanning electron microscope, warts 2–4 µm high. STERILE CELLS few, subglobose or irregular, 18–25 × 13–21 µm (n = 10), hyaline, wall 1.5–2.75 µm thick, smooth.

Dichelachne crinita [long-hair plume grass or pātītī (New Zealand Māori)] is indigenous to Australasia (Australia, New Zealand, Pacific Islands). It is found throughout New Zealand, usually in open vegetation under light scrub or forest, and in tussock grassland (Edgar & Connor 2010).

Discussion

The sori of *Tilletia* species most commonly form in the ovaries of grasses, producing so-called ‘bunt balls.’ Of the eleven species of *Tilletia* recorded in New Zealand (McKenzie & Vánky 2001; Vánky & McKenzie 2002), most are widely distributed in the world and have undoubtedly been introduced with seeds or soil. Only two species of *Tilletia* appear to be of Australasian origin. Both were described from Australia but are also known from New Zealand on two native grasses. *Tilletia cathcartae* Durán & G.W. Fisch. was recorded in New Zealand on the endemic *Poa pusilla* Berggr. and *P. xenica* Edgar & Connor (McKenzie & Latch 1984) and *T. inolens* McAlpine on indigenous *Deyeuxia quadriseta* (Labill.) Benth. (Cunningham 1945). The teliospores of *T. dichelachnes* are large in comparison with most other *Tilletia* species in New Zealand. Only three species have similarly large teliospores, but they are still



FIG. 1. *Tilletia dichelachnes* (PDD 117532, holotype): A. Smut-infected flowering head of *Dichelachne crinita*; B. Caryopsis broken open to expose teliospores; C. Teliospores by light microscopy; D. Teliospore by scanning electron microscopy. Scale bars: C = 20 μm ; D = 10 μm .

smaller than *T. dichelachnes*. Teliospores of *T. cathcartae* are 32–42 $\times$ 30–36 μm , *T. inolens* 36–45 $\times$ 32–40 μm , and *T. walkeri* Castl. & Carris 24–36(–40) $\times$ 23.5–36(–39) μm (Vánky & McKenzie 2002). When observed by scanning electron microscopy, the teliospores of these three species are also covered in warts rather than being reticulate as are some *Tilletia* species (Vánky 2012).

Of the worldwide known species of *Tilletia* described by Vánky (2012) only four have teliospores as large as those of *T. dichelachnes*. These are *T. eragrostiellae* Vánky & al. (36–52 $\times$ 40–60(–65) μm , on *Eragrostiella* spp., South Asia), *T. paradoxa* Jacz. (42–47 $\times$ 44–50 μm , on *Phleum* sp., Georgia), *T. puneana* Vánky (28–48 $\times$ 32–50 μm , on *Polytoca* sp. and *Chionachne* spp., India), and *T. transiliensis* M.N. Kusnezowa & Schwarzman (31–44(–46) $\times$ 34–48(–50) μm , on *Poa* sp., Eurasia). *Dichelachne*, *Phleum*, and *Poa* are in

the grass subfamily *Pooideae*, *Eragrostiella* is in subfamily *Chloridoideae*, and *Chionachne* and *Polytoca* are in subfamily *Panicoideae* (Soreng & al. 2015). The teliospores of *T. paradoxa* have spines that are 4–7 µm long while *T. transiliensis* has similar spines that are 3–6.5 µm long (Vánky 2012), making them distinct from those of *T. dichelachnes*. *Tilletia eragrostiellae* is distinct because of its 4–8(–9) µm high warts on the teliospores while *T. puneana* has dense 3–6.5 µm long, thin warts (Vánky 2012).

There appear to be no other records of *Tilletia* occurring on a species of *Dichelachne* (Vánky 2012; Farr & Rossman 2022), but another smut, *Tranzscheliella hypodytes* (Schltld.) Vánky & McKenzie has been recorded on *D. crinita* in Australia (Cook & Dubé 1989; Vánky & Shivas 2008) and on *Dichelachne* sp. in India (Gandhe 2011). In New Zealand, the cosmopolitan *T. hypodytes* is found on *Austrostipa nodosa* (S.T. Blake) S.W.L. Jacobs & J. Everett, *Elymus rectisetus* (Nees) Á. Löve & Connor [= *Anthosachne rectiseta* Barkworth & S.W.L. Jacobs], *Elytrigia repens* (L.) Nevski [≡ *Elymus repens* (L.) Gould], and *Poa cita* Edgar (Vánky & McKenzie 2002). However, this fungus produces blackish brown sori in the culms.

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